University of Alberta Library
0 1620 2749693 2

Joint Series
Publication No. 6

Revised, June, 1948

PROVINCE OF ALBERTA
Department of Agriculture

UNIVERSITY OF ALBERTA
Faculty of Agriculture

ONE-WAY DISC MAINTENANCE and OPERATION

Prepared by
E. B. MARTIN and B. T. STEPHANSON

Authorized by
HON. D. A. URE
Minister of Agriculture

Prepared under the direction of
THE PUBLICATIONS COMMITTEE
University of Alberta and Alberta Department of Agriculture, Co-operating

Printed by A. Shnitka, King's Printer
1948

Approved by

Alberta Agricultural Engineering Committee

Members:

PROFESSOR J.MACGREGOR SMITH ..... *Chairman*
Head, Department of Agricultural Engineering,
University of Alberta.

E. BRUCE MARTIN ..... *Secretary*
Extension Agricultural Engineer
Alberta Department of Agriculture.

B. T. STEPHANSON ..... *Lecturer*
Department of Agricultural Engineering,
University of Alberta.

J. K. MACKENZIE ..... *Instructor*
School of Technology and Art,
Calgary, Alberta.

F. F. PARKINSON ..... *Farm Mechanics Instructor*
Olds School of Agriculture,
Olds, Alberta.

S. C. ACHESON ..... *Farm Mechanics Instructor*
Vermilion School of Agriculture,
Vermilion, Alberta.

D. T. ANDERSON ..... *Machinery Specialist*
Dominion Experimental Station,
Lethbridge, Alberta.

H. LEGGETT .... *Assistant Superintendent, Field Husbandry*
Dominion Experimental Station,
Lacombe, Alberta.

Joint Series
Publication No. 6

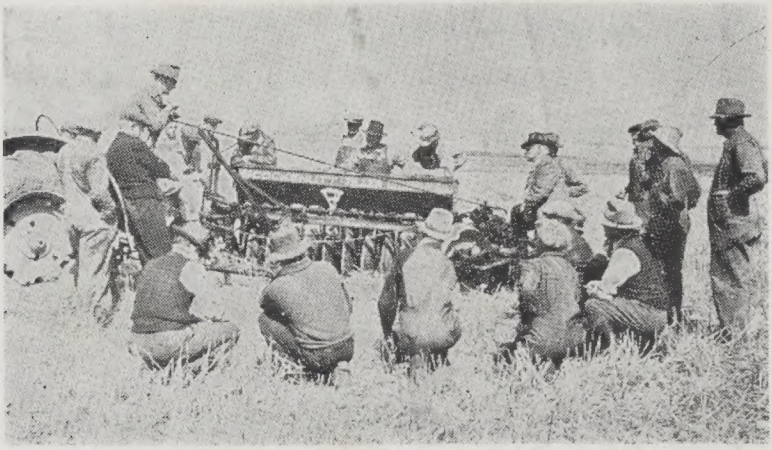
Revised, June, 1948

PROVINCE OF ALBERTA
Department of Agriculture

UNIVERSITY OF ALBERTA
Faculty of Agriculture

ONE-WAY DISC MAINTENANCE and OPERATION

Prepared by
E. B. MARTIN and B. T. STEPHANSON



ONE-WAY DISC UNDER DISCUSSION

Authorized by
HON. D. A. URE
Minister of Agriculture

Prepared under the direction of
THE PUBLICATIONS COMMITTEE
University of Alberta and Alberta Department of Agriculture, Co-operating

Printed by A. Shnitka, King's Printer
1948

CONTENTS

GENERAL OBSERVATIONS: Page

- Speed of Operation 3
- Rubber Tires 4
- Size of Discs 4
- Use in Seeding 4
- Packers for One-Way Discs 4
- Emergency Drifting Control 4
- Balanced Tractor and One-Way Disc Units 6
- Draft Data 6

ONE-WAY DISC ATTACHMENTS. ADJUSTMENTS

- Power 7
- Load 7
- Principle of Hitching 8
- Horizontal Adjustment 8
- Vertical Adjustment 8
- Wheel Adjustment 10
- Rear Furrow Wheel 11

TRACTOR HITCH FOR TWO ONE-WAYS:

- Chain Type 12
- Crossbar Type 12

ONE-WAY DISC SERVICING:

- Daily Maintenance 13
- Seasonal Check-up 13
- Gang Bearings 13
- Wheel Bearings 14
- Frame Bearings 14
- Power Lift 14
- General Tightening 15
- Condition of Discs 15
- Sharpening Discs 15

ONE-WAY DISC HARROW 16

ONE-WAY DISC MAINTENANCE AND OPERATION

In Alberta we have seen the number of one-way discs increase greatly during the last few years. Today there are about as many one-way discs in use as there are tractor plows. The horse plows still on farms are rapidly giving way to tractor plows or one-way discs.

The one-way disc has become one of the most important tillage implements in weed and soil drifting control. Properly used, the one-way is a most valuable aid to soil conservation. Improperly used it can cause excessive soil pulverization and consequent soil drifting or washing.

Plowless fallow and trash cover have proved effective in controlling drifting. A trash cover of stubble and weeds, left on the surface by the plowless method, provides excellent protection against soil drifting. The old standard method of summerfallowing by plowing in June with subsequent cultivation has largely given way to trash cover methods. The moldboard plow has been almost eliminated from the plains.

Many thought that continued use of a one-way disc would result in the formation of a "plow pan". This would then need to be broken up by mold-board plowing every few years. This plow pan theory has not been proven. There is little or no plow pan formed in western Canadian soils. There is no need for a tool to break up the subsoil. The frost action in our winters is a most efficient sub-soiler. No other sub-soiling agency is required in Alberta. To date the use of a sub-soil tool has shown no increase in yield.

The one-way disc must be used properly so that soil pulverizing and soil drifting are not promoted.

We should not use the one-way disc repeatedly because the stubble will become buried and excessive pulverization will result. The local conditions will determine if the one-way disc can be used more than once. If there is only a thin, short stubble, it will be destroyed by a second or third operation. If there is a long heavy stubble, then a second and third operation may be recommended.

GENERAL OBSERVATIONS

Speed of Operation

Test results show that the one-way disc operated at from three to four miles per hour requires less power than any other deep tillage implement. High speed operation is costly. It raises the cost out of all proportion to the amount of extra ground covered, and on stony land increases breakage. High speed operation pulverizes the soil, destroys the trash cover, and leaves the soil ready to drift.

Farmers with any regard for soil conservation should not tolerate high one-way disc speeds on their fields. We find that high speed one-way disc operation is one of the most common faults in its use. SPEEDS MUST BE KEPT TO 4 MILES PER HOUR OR LESS.

The tractor and one-way should be balanced in size to load the tractor at a proper speed. If the tractor will pull

the one-way at a higher rate of speed, consider using another implement in combination with it, such as a sub-surface packer. The other thing you can do is to obtain a larger one-way disc to build up the load for the tractor and reduce the speed of travel.

HIGH SPEED OPERATION IS COSTLY—first in the present power costs; secondly and more important, in future soil loss by wind or water erosion.

Rubber Tires

The use of rubber tires on the one-way disc will reduce the draft from 20 to 30% when operating in soft soil sonditions. Where land is firmer, the draft is reduced 10 to 20%. With the use of rubber tires however, additional care must be taken to set the hitch correctly. Extra weights may be needed on the rear furrow wheel to hold it in the furrow. In very hard ground you may have to use a steel wheel in place of the rear furrow wheel on rubber. The steel wheel with its sharp flange has the ability to dig into the furrow wall and hold better than the tire tread.

Size of Discs

The smaller discs are preferable because of their slighter dish and narrower spacings. Choose those of 22 inch diameter with 7 inch to 8 inch spacings rather than the 24 or 26-inch disc with 8 inch to 10 inch spacings. They clean better; they disturb the soil less; they reduce the draft, and they give longer service in stony land. The only advantage of larger discs is increased trash clearance.

Use in Seeding

The one-way disc with seeding attachment is an implement designed to disc and seed in one operation. It is used quite economically for seeding stubble land. The one-way disc is a rigid machine and consequently the depth of cut does not follow irregularities in the surface of the ground, also the discs being round do not cut the ground level but leave the bottom of the furrow ridged. Therefore it is most important that the seed spouts be adjusted uniformly so that the seed will be delivered into the bottom of the furrows as uniformly as possible.

The rate of seeding with the one-way disc should be somewhat higher than that with the grain drill to compensate for the loss of seed due to the uneven distribution.

Packers for One-Way Discs

The one-way disc, if used for seeding should have a packer behind for uniform and early germination of the seed.

The type of packer most satisfactory is one that will pack without pulverizing the soil, will cut through the surface trash to the bottom of the disc furrow and will not plug with moist soil or trash.

The surface type of packer is NOT satisfactory. To pack the soil with this type of packer it is necessary to weight it very heavily. The soil will then be very finely pulverized and left in a very susceptible condition for drifting.

The V-shape cast or disc and straight blade types of packers have proved most satisfactory under the majority of conditions. The V-shaped packer, when properly weighted, cuts through the trash to the bottom of the disc furrow providing lateral pack-

ing and firming of the soil around the seed. There is little puverization and the surface is left loose so that small weeds will dry out and die. The blade packer readily cuts through heavy trash covers, packing the soil every three inches.

Emergency Drifting Control

Operators in those areas of Southern Alberta subject to winter and early spring soil drifting, resulting from the removal of snow by chinook winds may not be fully aware of the emergency use of the one-way disc to control such drifting.

Fig. 1 shows a one-way disc equipped for ridging. Further information is available in Farmers' Bulletin number 32, Dominion Department of Agriculture. The bulletin is entitled "Soil Drifting Control in the Prairie Provinces."

Dom. Exp. Station, Lethbridge.

(*Fig.* 1) *Emergency Soil Erosion Control with the One-Way Disc*

ONE-WAY DISC ADJUSTMENTS

To set the one-way disc successfully requires some skill and considerable patience. Careful adjustment is necessary for proper maintenance, complete weed cutting, and for elimination of as much side draft as possible.

The principle of correct adjustment is quite simple and applies to all makes, although the method of making individual adjustments will vary. Adjustments on each machine will also

Table 1. **Balanced Tractor and One-Way Disc Units**

Size of Tractor	M.p.hr.	1 plow 9 h.p.	2 plow 12½ h.p.	3 plow 17 h p.	4 plow 22½ h.p.	5 plow 29 h.p.
Heavy Land (Clay and Clay Loam)	3-3½	4 ft.	6 ft.	8 ft.	10 ft.	2, 6 ft.
	4	3 ft.	5 ft.	7 ft.	9 ft.	2, 5½ ft.
Light Land (Loam and Sandy Loam)	3-3½	4½ ft.	6½ ft.	8½ ft.	2, 5½ ft.	2, 7 ft.
	4	3½ ft.	5½ ft.	7½ ft.	9½ ft.	2, 6 ft.

Note—Sizes given based on steel wheel equipment.

Table 2. **Draft of One-Way Disc, Moldboard Plow and One-Way Disc Harrow**

Implement and Size		Soil	Width Cut	Depth in.	Speed m.p.h.	Draft lbs.	Acres per hr.	Draft lbs. per foot width
One-Way Disc	6 ft.	heavy	6 ft.	4	3.5	1260	2.11	210
	6 ft.	light	6 ft.	4	3.5	1140	2.11	190
Moldboard Plow	2b14″	heavy	2⅓ ft.	4	3.5	641	0.98	275
	2b14″	light	2⅓ ft.	4	3.5	525	0.98	225
One-Way Disc Harrow	6 sec.	heavy	19 ft.	4	4.0	2000	10.6	93

vary with soil conditions.

The angle of cut can be changed on several makes of one-way discs. This change is made by loosening the rear end of the frame and swinging the land and rear furrow wheels to the desired position. For seeding the one-way may be set for a wide angle but for all other types of work it should be set on the narrow cut. The narrow setting will allow more penetration in hard ground and it will also cut the weeds better when set for shallow tillage.

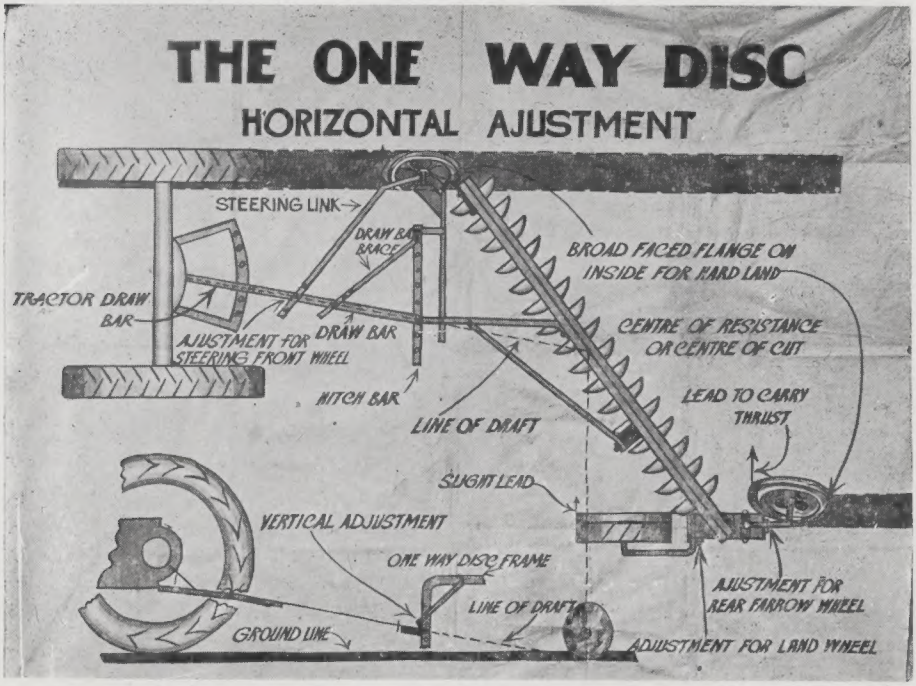
With any one-way disc outfit you have two points to consider —first, power; second, load or resistance.

Power

In any source of power, tractor or horses, there is always a point in that power known as the point of pull. It is the point through which all the pull is transferred to the implement. For the tractor this point of pull is the pin in the front end of the drawbar. This is a point midway between the tractor wheels and slightly ahead of the rear axle at the height of the drawbar.

Load

The next point to consider is the centre of draft or resistance in the implement. There is always some point where the resistance is balanced — a point that can be compared to the centre of gravity of an object. In the one-way disc the centre of resistance is at the centre disc or centre of cut, and about half the depth the disc is working. It may vary slightly according to the conditions encountered. Let us put the one-way disc in the soil at its work-



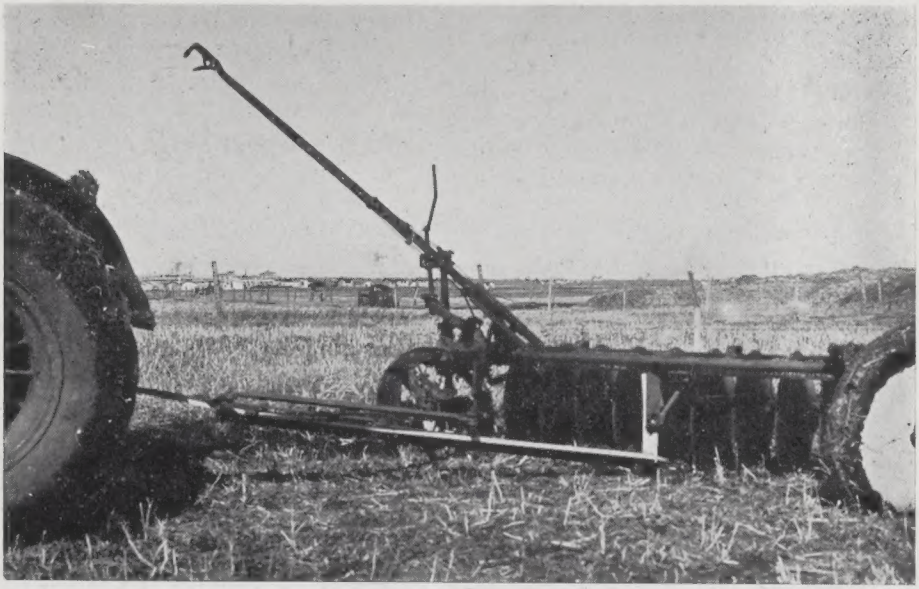
Courtesy, University of Saskatchewan.

(FIG. 2) *One-Way Disc Horizontal and Vertical Adjustments*

ing depth. Now, with the point of pull and centre of resistance determined, a string stretched between these points will show the true line of action.

Principle of Hitching

For proper hitching, the tractor drawbar and the one-way disc drawbar must be reasonably close to the line of action. To place them in that line of action, involves both horizontal and vertical adjustments. See Figure 2.



(FIG. 3) *Line of Action and Correct Drawbar Hitch* Govt. Photo.

Horizontal Adjustment

The horizontal adjustment will determine the effect of the side draft on the tractor and one-way. (Side draft means the centre of the power unit is not directly ahead of the centre of resistance.)

Side draft is encountered with any machine that is trailed to one side of the centre of the tractor. A plow or one-way disc will usually have some side draft, but there is no side draft with a drill or cultivator because the centre of the load is directly behind the centre of the tractor.

Before making the horizontal adjustment, guide the tractor so that the one-way is placed properly in the furrow and the front disc is cutting an inch less than the others. Now if the tractor is not where you want to operate it, unhitch the tractor and place it in position. The tractor is usually run with one wheel in the furrow to aid in steering.

Stretch the string between the point of pull and the centre of resistance to show the line of action. See Figure 3. The tractor drawbar and one-way hitch should follow this line. If the tractor drawbar is left swinging it will follow this line but if it is pinned it should be pinned in the line of action.

Vertical Adjustment

The vertical adjustment is the

most important one on the one-way disc. The general tendency is to have the tractor drawbar too low or the one-way drawbar too high, and with this arrangement the tractor will pull down on the front of the one-way. There will be too much weight on the front furrow wheel and too little on the rear furrow wheel. Without sufficient weight the rear furrow wheel will climb out of the furrow onto the land; it will be unable to guide and hold the machine in line.

To correct a faulty hitch, the tractor drawbar can be raised or the one-way drawbar lowered. Raising the tractor drawbar puts more of the tractor weight on the rear wheels, and this extra weight will help to decrease tire slippage.

The tractor hitch should be as high as practical without loading the sliding drawbar too heavily or affecting the steering of the tractor.

Lowering the one-way hitch can be done if there is adjustment available. If there is not enough adjustment on the gooseneck, then an extension or offset hitch may be used. See Figures 4 and 5. Note the extension hitch indicated by the arrow in Figure 4.

The vertical hitch on the one-way disc should be low enough so that the tractor does not pull down the front of the one-way disc.

Another adjustment that will help the vertical hitch is raising the rear end of the one-way on the rear furrow wheel. You can raise the rear end as long as the depth adjustment is not limited. The depth adjustment lever can be set for maximum depth. The

Govt. Photo.

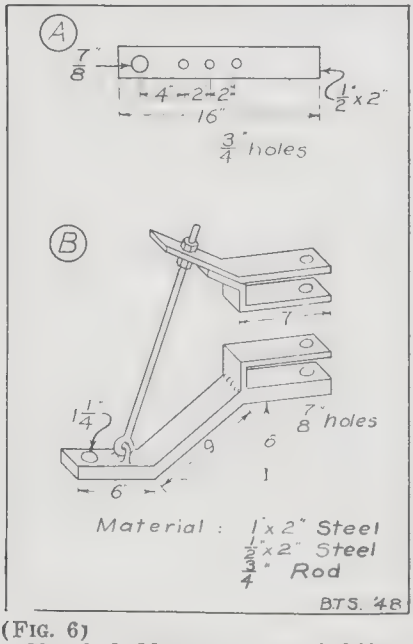
(FIG. 4) *Extension Used to Lower Hitch Point on One-Way Disc*
(See A Fig. 6)

front lever is used for levelling the depth of cut.

THE DRAWBAR OF THE TRACTOR MUST NOT PULL DOWN ON THE FRAME OF THE ONE-WAY DISC. At all times try to keep the frame level with the goose necks plumb.

Photo by B. T. Stephanson.

(FIG. 5) *Offset Extension Used to Lower Hitch Point on One-Way Disc.*
(See B Fig. 6)



(FIG. 6)
Sketch & Measurements of Offset Hitch Assembly

Wheel Adjustment

The load of the one-way should be carried about equally on each of the three wheels. This is possible only if the hitch adjustment is properly made. It will be noticed that the front and rear furrow wheels are not set upright as is the land wheel. The reason for this is that the one-way disc must be supported against side thrust in turning the furrow. These two furrow wheels are designed to provide a large part of this support with the tractor supplying the remainder.

The **front furrow wheel** is generally given a slight lead towards the plowed land. This helps the wheel to support the discs against the side thrust of turning the furrow.

The **land wheel** should operate

with a slight lead towards the plowed land for the same reason. A small amount of adjustment on this wheel can often be affected by the slotted holes. The rear wheel adjustment together with the hitch adjustment will straighten the land wheel most effectively.

The land and rear furrow wheels must be adjusted to work together for any width of cut and soil conditions. The front furrow wheel may need readjustment when an appreciable change in width of cuts is made.

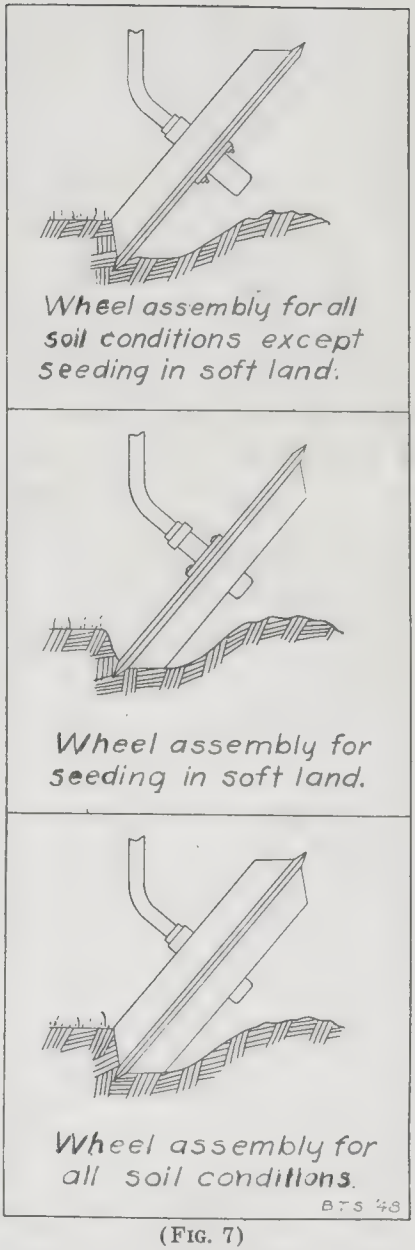
Rear Furrow Wheel

The rear furrow wheel provides most of the support. It is the rudder for the machine and this is why it is so important that the hitch in front be properly adjusted. The load must not be tipped off the rear wheel and put on the two front wheels. The rear furrow wheel is set, depending on the soil conditions, depth of plowing and tractor position, to absorb most of the side thrust. It is given enough lead towards the plowing to hold the machine with the front disc cutting at least an inch less than the others.

This adjustment and the vertical adjustment of the hitch are the most important on the one-way, and too often they are improperly made.

The broad faced rim on the furrow wheels should run against the furrow wall for all work other than seeding. In seeding, the broad face of the rim may be required on the bottom of the furrow to support it in the soft soil and ensure a more uniform depth of seeding. See Figure 7.

Some one-way discs have rims on the furrow wheels that can be removed for summerfallow


Wheel assembly for all soil conditions except seeding in soft land.
Wheel assembly for seeding in soft land.
Wheel assembly for all soil conditions.
BTS 48

(FIG. 7)

work. On other one-ways there is only one broad faced rim, but the wheel is reversible on the hub.

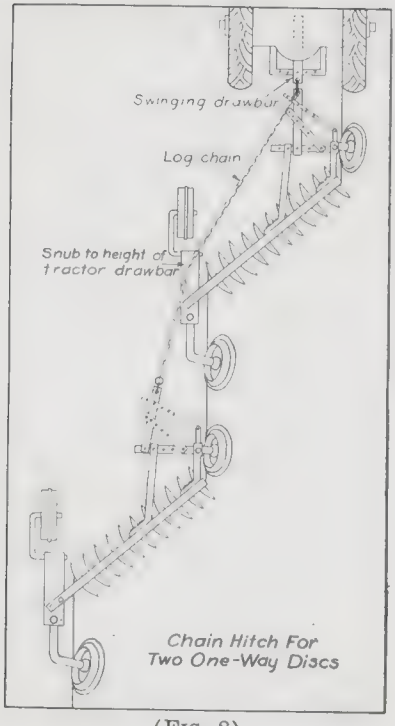
Another point on the furrow wheels that should be checked is their slope. The furrow wheels should not be upright like the

land wheel. There should be a definite slope. After some wear the two furrow wheels will have a tendency to straighten up. Wear in the axle and hub or a loose frame will allow the wheels to stand upright when the load is applied. The wheel in an upright position cannot hold against the furrow wall as well as a wheel in a sloping position. The wheel should work in the same way as a man pulling on a rope. You don't exert your maximum pull standing upright — you lean against the load.

TRACTOR HITCH FOR TWO ONE-WAYS

Chain Type

For a simple two one-way hitch use a chain from the front one-way to the rear one-way. The tractor may be worked either in the furrow or on the land as desired. The drawbar of the front one-way disc is hitched to the drawbar of the tractor so that the front disc is cutting the same width as the other discs. A chain from the drawbar of the tractor is passed through a guide fastened to the rear of the front one-way disc. The guide will keep the draw chain inside of the land wheel and away from the discs and at least as high as the tractor drawbar. The length of the chain will need to be adjusted if the front disc of the second one-way does not cut the proper width. See Figure 8.



(FIG. 8)

Crossbar Type

A second method of constructing a two one-way hitch is by use of a heavy crossbar. This crossbar must be sturdy enough to prevent buckling and have the same length as the width of cut of the front one-way disc. The front machine is connected to the furrow end of the crossbar and the rear machine to the other end. The drawbar of the rear machine is connected to the crossbar by means of a chain long enough to permit it to follow the front one. The draw chain is fastened to the rear of the front one-way disc by a guide chain so that the rear machine will cut the correct width. The crossbar is hitched to the swinging tractor drawbar by two chains of convenient length. With this type of two one-way hitch the tractor operates on the stubble rather than in the furrow.

ONE-WAY DISC SERVICING

Daily Maintenance

Servicing of the one-way disc is confined to greasing during operation and general tightening. The hanger and thrust bearings do not have sufficient capacity to operate more than three hours continuous running. The wheel bearings, however, have capacity of at least ½ day operation.

Frequent greasing with a moderate quantity of grease will provide better lubrication than completely filling the bearings at longer intervals.

The bearings are practically all slow moving, heavy duty bearings, requiring a grease that will work under pressure and stick to the working surfaces. Many soft gun greases are not sufficiently sticky but there are specially compounded greases available for lubricating the one-way disc. These greases are sticky, yet semi fluid. The common soft gun grease can often be greatly improved by the addition of 10 per cent to 15 per cent of transmission oil, well mixed with a paddle. The transmission oil provides the sticky quality of the grease. The same grease provides good lubrication for machines equipped with grease cups.

Machines in operation should be watched keenly for loosening of parts. The practice of lining up nuts square with the metal edges makes it possible for an operator to notice nuts which are working loose.

The relation of the discs, arbor bolts and spacers must be watched continuously. Operation in stony or heavy land where strains are applied to the discs and gangs causes loosening, which if not detected and tightened results in breakage and excessive wear. To determine looseness, strike each disc a light blow with a hammer when the disc gang is raised, and note the ring of the disc. The gang bolts must be driven home when being tightened, if the tightening is to last.

Seasonal Check-Up

The condition of the one-way disc depends upon the wear of the disc blades, the gang and wheel bearings and the power lift and its linkage. The machine should be inspected every day when in use and small repairs made to maintain a good state of repair.

Gang Bearings

It is rather difficult to determine the condition of the disc hanger or thrust bearings when operating the machine. Whenever the discs are removed for sharpening, the bearing may easily be inspected for wear. However, before the discs are removed, the bearings should be inspected for slack, both horizontal and vertical. Horizontal slack will indicate wear in the thrust bearing, and vertical slack will indicate wear in the hanger bearings.

Slack may be indicated by using a lever and block to pry up under the disc gang. Where the slack is considerable the shells or bearings should be replaced. The amount of horizontal slack may be determined by prying upon the bottom of the disc gang and moving it back and forth. The extent of gang movement will indicate the slack. If the slack is excessive, the disc thrust bearing or bearings should be inspected. These bear-

ings may be ball bearings, taper roller bearings, or flat plate bearings. The ball and roller bearings may be washed out and readjusted if the wear is not beyond the range of adjustments provided but if the wear is excessive, the bearings must be replaced. The plate thrust bearings are fitted with steel or bronze plates which, when worn, may be replaced. The thrust plates need not be replaced unless worn to such an extent that wear of the brackets or housing results from turning of the discs.

All bearings should be washed out to get rid of the dirt. Dirt seals and oil felts should be replaced to ensure as dust-free operation as possible. For clean lubrication pack the bearings with the proper lubricant.

Wheel Bearings

Well lubricated wheel bearings that have not been overloaded by an improperly adjusted high hitch will not show excessive wear. Wear may be determined by jacking up the one-way disc so that the load is off the wheels. The wear will be found in two forms—horizontal from thrust and vertical from load.

Horizontal wear may be taken up by a thrust washer placed between the wheel hub and the axle collar. Steel washers are procurable from implement agencies and local hardware stores to meet practically every requirement. The wear of the pin retaining the thrust collar on the axle should be checked. The pin should be replaced with a new steel pin, not a bolt, whenever the slack between the pin and hole in the axle indicates excessive wear. Where excessive wear has taken place, the hole should be reamed and an oversize steel pin put in its place.

Vertical wear occurs between the wheel boxing and the axle. The boxing is cast iron and should be replaced if the wear is sufficient to cause misalignment or poor grease control. Where the axle is badly cut or worn, it should either be built up in the shop or replaced. All bearings should be washed out and replaced with the proper lubricant, and all dust and oil seals replaced or renewed, so that clean lubrication will result.

Frame Bearings

The large front frame casting with bearing which slides up and down on the front wheel standard is often partially exposed to dust and dirt. There is no remedy for wear in this part except replacement which may be expensive. Wear causes tilting of the front wheel, excessive pressures on the wheel and standard bearing, and poor control of the width of cut of the first disc. The excessive bearing pressures cause difficulty in lubrication and bearing wear. The casting should be replaced before cutting, or excessive wear takes place on the vertical shaft.

The shaft and casting should be protected from dust by canvas dust shields, both on top and bottom. These shields must be sufficiently loose to provide for the maximum lift of the front end of the one-way on the vertical shaft. Ample lubrication should be provided for this bearing at all times.

Power Lift

The power lift may be an open type or an enclosed oil-bath type. Where it is an open type, the power lift should be inspected for wear when the land wheel of the one-way is raised for

wheel bearing inspection. If the wheel bearing is not worn, the power lift will not be worn excessively. However, if any difficulty has been noted in the action of the power lift, the wheel should be removed and the power lift thoroughly cleaned and inspected for wear.

After the power lift is cleaned and oiled, the wear of the rollers and pins of the dogs and the tension of the springs should be examined, and replaced when necessary. There may be thrust washers between the release plate and dog clutch, which space the two properly. When the release drags from contact with the housing, the thrust washers should be replaced or added. Where excessive wear has occurred between the dog clutch housing and the axle, the housing must be replaced and the axle built up or replaced. Pins and supports for the power lift linkage should be inspected for wear and reamed out and fitted with oversized pins when necessary. Where wear occurs because of improper lubrication, the addition of small grease nipples will make lubrication possible and greatly lengthen the life of the parts.

Where difficulty with the power lift has been experienced and the power lift and linkage have been overhauled, the spring tension assisting the power lift should be examined and increased. The spring tension should not be increased so that the depth control is affected. Where extra springs are used with the seeder box attachment and where packers are trailed behind, the springs should be sufficiently tight to assist the lift with the extra load.

General Tightening

All bolts including the disc arbor or gang bolts must be inspected frequently and tightened. The arbor or gang bolts should be "sledged home" when being tightened, in order to draw them up sufficiently to hold. Whenever the arbor bolt nuts are not easily accessible, the gangs should be removed from the hangers and driven home and tightened. Loose gang bolts will cause serious centre disc wear and breakage of spacers.

Condition of Discs

The quality of work done the last time the machine was used may indicate the need for sharpening. If rose bushes, Canada thistle, or weeds of this type remain uncut in the furrow, or if the discs do not cut quack grass when operating at a shallow depth, the discs should be sharpened. The addition of weight will not take the place of sharpening. Cracked, chipped or broken discs should be replaced, or welded and sharpened.

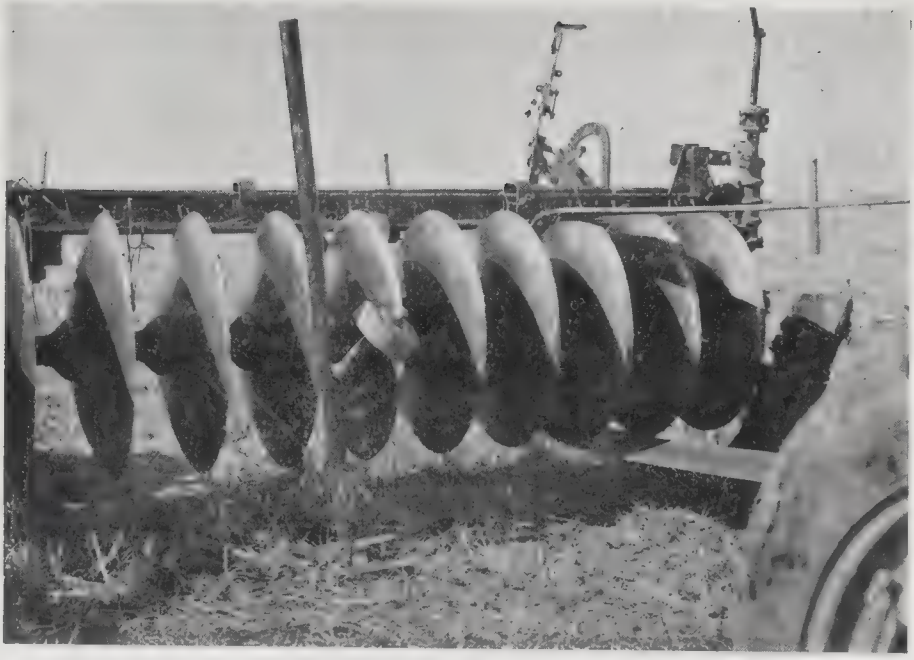
Discs, when not in use, should be covered with a rust-proof compound. This will ensure bright polished discs that will operate without sticking the next time they are used.

Sharpening Discs

There are two methods of sharpening the one-way disc blades:

1. Rolling between high-pressure rollers.
2. Grinding or turning.

The principle of sharpening discs by cold rolling has been used for 40 years. Machines for sharpening plough and harrow discs were of this type. The same type of machine is used in many blacksmith shops for sharpening the one-way disc blades. The discs are centred in the ma-



(FIG. 9) *M.S.L. Disc Sharpener in Position*
Available at your local dealer or Implement Parts Distributors, Edmonton, Calgary, Lethbridge, Red Deer

chine, and the thickness of the blade is reduced by gradually increasing the pressure on the rollers between which the discs are revolved. The rolling is done from 2 inches back of the edge to not closer than ¼ inch from the edge. Where the disc is rolled thin at the edge of the material, cracks and small pieces are apt to break and fall out. Where it is necessary to have a knife sharp edge, the disc can be edged on a grinding wheel. Usually it is not desirable to have the very edge too thin, because of contact with stone. The diameter of the disc increases about ⅝ inch to ⅞ inch during the rolling process. The original concavity of the disc can be maintained while rolling. Grinding or turning the back of the disc blade to reduce the thickness is, in a sense, wasteful of material. The discs can be ground so that quality of work done is just as good as when the disc was sharpened by rolling. The only disadvantage is that the diameter of the disc will be reduced in the process of sharpening.

There are two ways of grinding discs; you can take each disc off and sharpen it on an emery wheel, or sharpen them while they are still on the disc gang. If the discs are removed, a jig can be used with the emery wheel. A disc mounted in this jig will be sharpened and rotated by the emery wheel. The slow rotation of the disc will prevent any one spot becoming overheated.

The discs may be sharpened satisfactorily on the one-way by using a sharpener illustrated in

Figure 9. This sharpener does not put a long tapering edge on the disc. It removes the rounded hump from the back of the disc and produces a short chisel edge that will be satisfactory for cutting.

The sharpener is very simple to operate. The one-way disc is raised out of the ground so that all the discs are clear to turn. A 4 to 6 inch belt is then put on one of the discs and belted to the tractor behind the one-way. The discs may be rotated in either direction as desired. The discs are rotated at slightly more than idle tractor speed and not at full throttle.

Contrary to your first impression, the belt will not be injured by running in contact with the disc edges. Because the disc diameter is large, the belt does not need to be tight.

The sharpener is placed next to the disc and adjusted. The rotating disc in contact with the stone will rotate it. The angle of the stone is adjusted so that it turns rapidly enough not to be cut severely. It must turn slower than the disc so that there is an abrasive action between them.

Wear goggles or glasses for protection against flying bits of stone or metal.

Some experience is necessary to operate the sharpener efficiently. Watch the angle of the stone to protect it from excessive chipping. Heavy pressure will wear the stone rapidly. The operator must judge the work so that there is a maximum cutting action on the disc without excessive wear on the stone.

ONE-WAY DISC HARROW

The one-way disc harrow is illustrated in Fig. 10. The first designs resulted from the joint effort of a blacksmith and several farmers of the open plains area of Saskatchewan. First demonstrations were held at Kindersley in early 1945. The one-way disc harrow was designed to give shallow, economical tillage similar to the single disc. It is an improvement over the single disc however, giving a more complete cut of the weed growth and eliminating the ridging so common with the disc harrow.

The most successful one-way disc harrows have been built similar to the one-way disc. The discs are smaller being 16 or 18 inches in diameter and spaced 6 or 6½ inches apart. These machines are operated with steel or rubber mounted wheels. In either case however, the rear furrow

Courtesy, University of Saskatchewan.
(FIG. 10) *One-Way Disc Harrow*

wheel must be fitted with weights of at least 200 lbs. to provide adequate traction to hold the rear of the machine in position.

Draft requirements of the one-way disc harrow are just slightly greater than the single disc harrow for the same depth and speed of operation. Table 2 lists the comparative draft figures. Being designed similar to the one-way disc, the hitch and adjustment problems and solutions are much alike.

Due to its unusual width, the one-way disc harrow is built so that it can be drawn endwise after a few quick changes to the wheel positions. The quality of the work done by this machine has been very good. It has given a clean cut while leaving the stubble and trash well anchored in the surface soil. It has worked without excessive soil pulverization at operating speeds of about 4 m.p.h. As with the one-way disc, care must be taken when operating at high speed—otherwise excessive pulverization will result. The one-way disc harrow made its appearance in Alberta in 1947 and on the basis of its performance to date, it is likely to play an important part in the tillage program on many Alberta farms.

Prairie Provinces Collection